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Indian Standard

RECOMMENDATIONS FOR HYDROSTATIC STRETCH TESTING OF COMPRESSED GAS CYLINDERS

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NEW DELHI 1

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Indian Standard

RECOMMENDATIONS FOR HYDROSTATIC STRETCH TESTING OF COMPRESSED GAS CYLINDERS

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Indian Standard
RECOMMENDATIONS FOR HYDROSTATIC STRETCH TESTING OF COMPRESSED GAS CYLINDERS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 5 October 1970, after the draft finalized by the Gas Cylinders Sectional Committee had been approved by the Mechanical Engineering Division Council.

0.2 Manufacture, possession, and use of any gas, when contained in cylinders in a compressed or liquefied state, are regulated by the Gas Cylinder Rules, 1940, of the Government of India. This code has been prepared in consultation and agreement with the statutory authorities under these rules.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard describes methods for the hydrostatic stretch testing of cylinders intended for the storage and transport of compressed gases. Two methods, namely, water jacket method and non-jacket method, have been covered.

2. WATER JACKET METHOD

2.1 Apparatus — The arrangement of apparatus for the test may be of the type indicated in Fig. 1.

2.1.1 *Graduated Tube* — The graduated tube used for the measurement shall be of such diameter that a permanent change in volume of the cylinder of the order of 1/20 000 the total cylinder capacity may be readily

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*Rules for rounding off numerical values (*revised*).

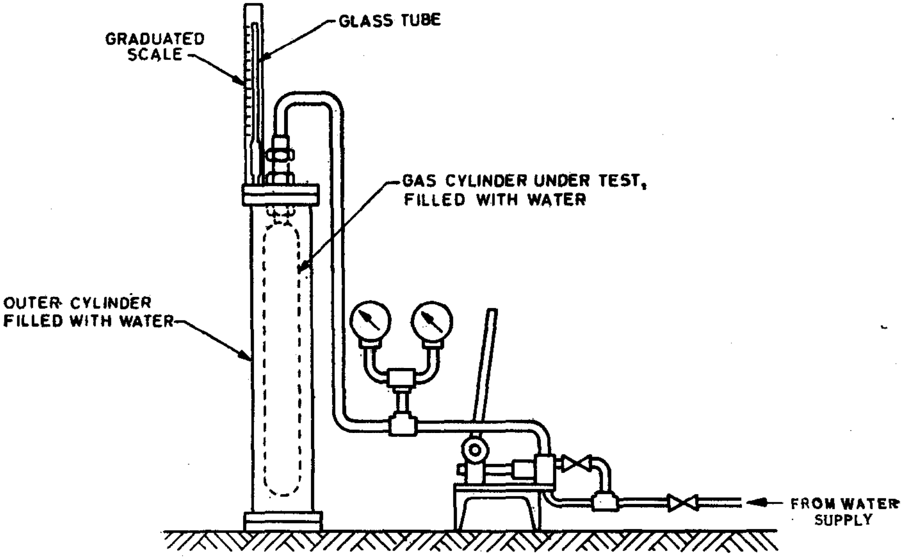
GLASS TUBE
GRADUATED SCALE
GAS CYLINDER UNDER TEST, FILLED WITH WATER
OUTER CYLINDER FILLED WITH WATER
FROM WATER SUPPLY

FIG. 1 WATER JACKET METHOD

observed. Also the length of tube shall be such that its capacity exceeds the total volumetric expansion of the cylinder under test. The diameter shall be uniform and sufficiently small to permit an accurate reading of the expansion.

2.1.2 *Pressure Gauge* — Two pressure gauges or a duplicate gauge shall be used and shall be capable of reading to within one percent of the test pressure for pressures up to and including 15 kgf/cm^2 and within two percent for pressures above 15 kgf/cm^2.

2.2 Procedure Before Testing — The water jacket shall be filled with water to a convenient level on the graduated glass tube. Also arrangement for expelling entrapped from the water jacket shall be made.

2.3 Precautions — Care shall be taken to prevent any leakage through the joint between the cylinder neck and the water jacket cover. Change of temperature of the water in the jacket during the test shall be avoided.

2.4 Readings — Readings of the water level in the graduated tube shall be taken:

a) before the test pressure has been applied to the cylinder (C_1),

b) after the test pressure has been applied for 30 seconds (C_2), and

c) after the release of the test pressure (C_3).

The difference between C_1 and C_2 represents the total volumetric expansion and the difference between C_1 and C_3 represents the permanent expansion.

3. NON-JACKET METHOD

3.1 Apparatus — The arrangement of apparatus for the test may be of the type indicated in Fig. 2.

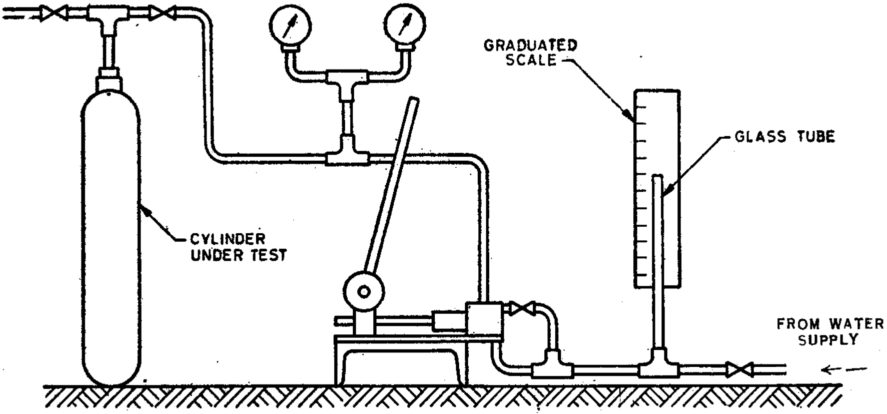

Fig. 2 Non-Jacket Method

3.1.1 *Graduated Tube* — The graduated tube used for the measurement shall be of such diameter that a permanent change in volume of the cylinder of the order of 1/20 000 the total cylinder capacity may be readily observed. Also the length of tube shall be such that its capacity exceeds the total volumetric expansion of the cylinder under test. The diameter shall be uniform and sufficiently small to permit an accurate reading of the expansion.

3.1.2 *Pressure Gauge* — Two pressure gauges or a duplicate gauge shall be used and shall be capable of reading to within one percent of the test pressure for pressures up to and including 15 kgf/cm^2 and within two percent for pressures above 15 kgf/cm^2.

3.2 Procedure Before Testing — Before connections are made for testing, the cylinder shall be completely filled with water and also arrangement for expelling entrapped air from the cylinder shall be made.

3.3 Connections — All connections shall be air-free and watertight.

3.4 Precautions — The water used shall be air-free and the joints shall be leakproof as far as possible. However, if necessary, care shall be taken to ensure that the quantity of water in the system is always constant by returning any water leaking past the joints to the system. Piping shall be as short as possible and of as small a volume as practicable. Pump shall be of sufficient capacity to build the required pressure in a reasonable period of time.

3.5 Readings — A reading (C_1) of the water level in the graduated tube shall be taken when the apparatus has been completely filled with air-free water and the valve to the water supply has been closed.

3.5.1 After the test pressure has been applied for 30 seconds, a second reading (C_2) of the water level shall be taken. A final reading (C_3) shall be taken after removal of the internal pressure by opening the release valve.

3.5.2 The difference between C_1 and C_2 represents the total volumetric expansion. However, the apparent total volumetric expansion calculated in this manner needs to be corrected by deducting an amount equal to $4{\cdot}12 \times 10^{-5}\ PV$, where P is the test pressure in kgf/cm^2 and V is the volume of water under compression in cm^3. The difference between C_1 and C_3 represents the permanent volumetric expansion without the necessity of correcting for the compressibility of water.